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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,367	10/28/2003	Oswin Ottinger	SGL 02/24	5955

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EXAMINER
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VIJAYAKUMAR, KALLAMBELLA M

ART UNIT	PAPER NUMBER
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1793

MAIL DATE	DELIVERY MODE
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06/10/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/695,367	<b>Applicant(s)</b> OTTINGER ET AL.	
	<b>Examiner</b> KALLAMBELLA VIJAYAKUMAR	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3,4 and 7-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-4 and 7-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1793

**DETAILED ACTION**

- Applicant's amendment filed along with the arguments 02/18/2009 has been fully considered. Claims 1, 3-4, and 7-8 were amended. Claims 2 and 5-6 cancelled. Claims 1, 3-4 and 7-13 as amended are currently pending with the application. The claims are drawn to a heat storage device and its method of making.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1 and 7-13 are rejected under 35 U.S.C. 103(a) as obvious over Meza et al (US 6,620,359) in view of Chatval (US 3,361,684).

Meza et al teach the composition of molded polymeric article comprising a polymer such as nylon, PPS, PP, HDPE and TPO <PCM> and 1-20 wt% Expanded Graphite (EG) powder (CI-3, Ln 27-29, 50-54). Applicants define PCM to be substances which undergo a phase transition

Art Unit: 1793

*at a given temperature when heat is supplied or removed, for example a phase transition from the solid phase to the liquid phase (melting) or from the liquid phase to the solid phase (solidification) (Spec, Pg-1, Ln 13-19), and the prior art polymers meet this limitation. PP and HDPE meet the limitation of paraffins in claim-7. The EG was obtained by grinding recycled flexible graphite to a powder with a particle size of 20-80 mesh (180-250 micron) and having a bulk density of 0.177-0.230 g/cc (Cl-2, Ln 1-18). The ground EG was re-expanded by a factor 100-150X (Cl-3, Ln 15-16) and processed in to a gasket (Cl-3, Ln 21-23). The EG powder was mixed with the resin/polymer in a heated tubular mixer or premixed and molded into a **pellet** (Cl-3, Ln 40-47; Cl-4, Ln 7-18, 19-29). The pellet meets the limitation of heat storage device containing a heat storage material mixture in the claims.*

The prior art is fails to teach the bulk density and particle size of EG per the claims 1 and 8; and making the device by jolt-molding per claim 13.

However, the prior art teaches using a modified EG with a particle size 25-80 mesh (710 micron-180 micron) and a bulk density of 0.177-0.230 g/cc (177-230 g/l), that overlaps with the respective instant claimed ranges and prima facie obvious because In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. <MPEP 2144.05 [R-5]-I>.

Pertaining to claim-13, the prior art teaches molding the composite into a shape and it would have been obvious to a person of ordinary skilled in the art to substitute the molding technique with other common molding techniques including jolting molding as functional equivalent with predictable results and reasonable expectation of success because it was well known in the art to at the time of disclosure of the invention by the applicants to use it in making filled resin composites (Chavatal et al, US 3,361,684; Title, Cl-5, Ln 35-40).

2. Claims 1 and 7-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bader (Thesis, Univ. Auckland, February 2002) in view of either Eska et al (DE 19630073 A1) or Glueck et al (US 6,130,265).

Art Unit: 1793

The prior art teaches a thermal energy storage composition comprising LDPE, EVA, paraffin wax ( $d = 0.84\text{--}0.92\text{ g/cc}$ ) and 5 wt% expanded/exfoliated graphite powder (EG) (Pg-11; Table 3.1-1; Pg-18, Table 3.2-1). The exfoliated graphite had a particle size of less than 12 micron for UF2 96/97 and less than 45 micron for EDM 96/97. The prior art molds the composition into a pellet that meets the limitation of heat storage device containing a heat storage material mixture in the claims.

The prior art fails to teach the composition/article containing compacted and comminuted expanded graphite particles, and is silent about the volume % of the components and density of the expanded graphite per the claims -1 and 8, and mixing particles per claim-9.

The prior art teaches using a commercially available expanded graphite with a particle size of <12 micron or <45 micron after exfoliation in the composition. The bulk density of the prior art EG would be obvious over the density values for EG used in a latent heat device at the time of the disclosure of the invention by the applicants which is 75-1,500 g/l (See Eska et al, DE 19630073 A1, Abstract; See Tamme, Workshop on Thermal Storage for Trough Power Systems, Feb. 20-21, 2003, Golden CO, Page-17; See Glueck et al, Cl-3, Ln 1-4 and 62-63: 100-500 g/l). The prior art component volume ratios when calculated as volume % using the density values  $[95/0.84\text{ paraffin} : 5/0.075\text{ EG}] = (113.09\text{ cc} : 66.66\text{ cc})$  or 37.09 v% EG] would overlap over instant claimed ranges in claims 1 and 8. The prior art teaches a composite containing expanded graphite that is either same or substantially same as that obtained by a specific process step/treatment in the instant claims, and a prima-facie obviousness exists because, Where the claimed and prior art products/components are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

With regard to claim-7, the prior art teaches paraffin.

With regard to claims 8 and 10-11, the prior art teaches making a PCM by mixing the components, melt blending the components and forming a pellets (Page-15) and shaping the product by melt injection (Page-16).

Art Unit: 1793

With regard to claim-9, the prior art teaches blending of the components, and an elimination of a pre-blending the particles as a choice of design of the process conditions by a person of ordinary skilled in the art would be obvious, because Omission of an Element/Step and Its Function Is Obvious If the Function of the Element/Step Is Not Desired Ex parte Wu , 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989) <MPEP 2144.04>.

3. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bader (Thesis, Univ. Auckland, February 2002) in view of either Eska et al (DE 19630073 A1) or Glueck et al (US 6,130,265) and further in view of Neuschutz et al (US 2002/ 0033247).

The disclosure by Bader et al on the composition and making of the a latent heat storage/PCM device as set forth in rejection-5 under 35 USC 103(a) is herein incorporated.

The prior art fails to teach the addition of a nucleating agent per claims-3-4.

In the analogous art, Neuschutz et al teach the addition of axillaries such as nucleating agents to the compositions containing liquid-solid PCM's containing graphite (Para 0035; 0040-0041).

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to include nucleating agents in the latent heat storage device of Bader to minimize super cooling effects with reasonable expectation of success because it is a solid-liquid type PCM device and teachings are in analogous art. With regard to claim-4, it requires an addition of a miniscule amount of a nucleating agent to the composition, and this would be obvious over the addition a nucleating agent to the composition of Bader et al.

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bader (Thesis, Univ. Auckland, February 2002) in view of either Eska et al (DE 19630073 A1) or Glueck et al (US 6,130,265) and further in view of Chavatal et al (US 3,361,684).

The disclosure by Bader et al on the composition and making of the a latent heat storage/PCM device as set forth in rejection-5 under 35 USC 103(a) is herein incorporated.

The prior art fails to teach making the device by jolt-molding per claim 13.

Art Unit: 1793

However, the prior art teaches molding the composite into a shape and it would have been obvious to a person of ordinary skill in the art to substitute the molding technique with other common molding techniques including jolting molding as functional equivalent with reasonable expectation of success because it was well known in the art to at the time of disclosure of the invention by the applicants to use it in making filled resin composites (Chavatal et al, US 3,361,684; Title, Cl-5, Ln 35-40).

5. Claims 1 and 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiao et al (Energy Conversion and Management, January 2002, (43), Pages 103-108) in view of Eska et al (DE 19630073 A1).

The prior art teaches a shape stabilized latent heat storage device comprising SBS rubber ( $d=0.98$  g/cc), paraffin ( $d=0.84$ - $0.9$  g/cc) and expanded graphite (EG) in the ratio of 80:20:5 parts by weight respectively (Page-103, Abstract; Page 104, Sec. 2.1 and 2.3; Pg-105, Section 2.5; Page-106, Sec 3.2). The particle size of the expandable graphite was 300 microns. The prior art teaches a cylindrical device comprising a mixture of EG with molten paraffin/PCM (Page-104, Sec. 2.3, Page-105, Sec 2.5) that meets the limitation of heat storage device.

The prior art fails to teach the composition/article containing compacted and comminuted expanded graphite particles, and silent about the volume % of the components and density of the expanded graphite per the claims -1 and 8, and mixing particles per claim-9.

The prior art teaches using a commercially available expanded graphite with a particle size of 300 micron after exfoliation in the composition. The bulk density of the prior art EG would be obvious over the density values for EG used in a latent heat device at the time of the disclosure of the invention by the applicants which is 75-1,500 g/l (Eska et al, DE 19630073 A1, Abstract; Tamme, Workshop on Thermal Storage for Trough Power Systems, Feb. 20-21, 2003, Golden CO, Page-17). The prior art component volume ratios when calculated as volume % using the density values  $[(80/0.98 : 20/0.84 \text{ paraffin} : 5/0.75 \text{ EG}) = (81.63 \text{ cc} : 23.81 \text{ cc} : 6.66 \text{ cc})$  or 5.94 %(v) EG] would overlap over instant claimed ranges in claims 1 and 8. The prior art teaches a composite containing expanded graphite that is either same or substantially same as

Art Unit: 1793

that obtained by a specific process step/treatment in the instant claims, and a prima-facie obviousness exists because, Where the claimed and prior art products/ components are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

With regard to claim-7, the prior art teaches paraffin.

With regard to claims 8 and 10-11, the prior art teaches making a cylindrical device by mixing EG with molten paraffin/PCM and molding the composition in to cylinder (Page-104, Sec. 2.3, Page-105, Sec 2.5).

With regard to claim-9, the prior art teaches blending of the components, and an elimination of a pre-blending the particles as a choice of design of the process conditions by a person of ordinary skilled in the art would be obvious, because Omission of an Element/Step and Its Function Is Obvious If the Function of the Element/Step Is Not Desired Ex parte Wu , 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989) <MPEP 2144.04>.

6. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiao et al (Energy Conversion and Management, January 2002, (43), Pages 103-108) in view of Eska et al (DE 19630073 A1) and Neuschutz et al (US 2002/0033247).

The disclosure by Xiao et al on the composition and making of a latent heat storage device as set forth in rejection-8 under 35 USC 103(a) is herein incorporated.

The prior art fails to teach the addition of a nucleating agent per claims-3-4.

In the analogous art, Neuschutz et al teach the addition of axillaries such as nucleating agents to the compositions containing liquid-solid PCM's containing graphite (Para 0035; 0040-0041).

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to include nucleating agents in the latent heat storage device of Xiao to minimize super cooling effects with reasonable expectation of success because it is a solid-liquid type PCM



Art Unit: 1793

device and teachings are in analogous art. With regard to claim-4, it requires an addition of a miniscule amount of a nucleating agent to the composition, and this would be obvious over the addition a nucleating agent to the composition of Xiao et al.

7. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiao et al (Energy Conversion and Management, January 2002, (43), Pages 103-108) in view of Eska et al (DE 19630073 A1) and either Hayward, (US 5,882,570) or Chavatal et al. (US 3,361,684).

The disclosure by Xiao et al on the composition and making of the a latent heat storage device as set forth in rejection-8 under 35 USC 103(a) is herein incorporated.

The prior art is silent about making the device by specific molding per claims 12-13.

However, the prior art teaches molding the composite into a shape, and it would have been obvious to a person of ordinary skilled in the art to use common molding techniques including injection molding which was routinely used for molding polymer/graphite composites (Hayward, US 5,882,570, Abstract) or jolting molding used for making filled resin composites (Chavatal et al, US 3,361,684; Title, Cl-5, Ln 35-40) as functional equivalent of molding process predictable results and reasonable expectation of success, because these processes were well known in the art for molding polymer composites at the time of the disclosure of the invention by the applicants.

### ***Response to Arguments***

Applicant's arguments with respect to claims filed 02/18/2009 have been fully considered but not persuasive for the following reasons:

In response to the argument that none of the cited references (Meza, Bader, Xiao) teach the heat storage device containing the heat storage material, the prior arts teach molded articles such as pellet/cylinder that obviously meets the limitation of heat storage device containing the heat storage materials (Res, Pg-8, Para-3; Pg-9, Para-2; Pg-10, Para-2).

Art Unit: 1793

In response to the argument that Meza does not make the point of changing the densities and particle sizes (Res, Pg-10, Para-1), the corresponding values by Meza overlap with instant claimed ranges and prima facie obvious that is reflected in the modified rejection above.

The examiner withdraws the rejections over Doi (JP 63-023993) and Kusuyama (US 5,294,300).

For the reasons set forth above, applicants fail to patentably distinguish their composition and process over the prior art.

It is suggested to call the examiner to discuss the patentability issues.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KALLAMBELLA VIJAYAKUMAR whose telephone number is (571)272-1324. The examiner can normally be reached on M-F 07-3.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 5712721358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1793

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KMV/  
June 5, 2009.

/Stanley Silverman/  
Supervisory Patent Examiner, Art Unit 1793